

Opportunities to Move Forward

Renewable energy will capture a significant share of the world energy market over the next 20 years.
— Kenneth L. Lay, Chairman and Chief Executive Officer, Enron

Renewables are at a critical juncture as the domestic electricity marketplace moves toward an era of increased choice and greater diversity. The cost and performance of these technologies have improved dramatically over the past decade, yet their market penetration has stalled as the power industry grapples with the implications of the emerging competitive marketplace. The challenge today is to build on past progress and create new opportunities for renewables in the future.

Those making decisions regarding our nation's energy use can lead the way to a brighter energy future. Legislators and policy makers at all levels of government are playing an important role in shaping this future. The energy choices we make today can improve the economy, the environment, and the way we conduct our nation's business in the future. This section describes many of the issues facing renewable energy development in the electricity sector and identifies key areas where policy and decision makers can positively affect the energy path that we as a nation will follow.

Policies Affecting Renewables

Most of the non-hydropower renewable electricity development in the United States has been policy driven. The Public Utility Regulatory Policies Act of 1978 (PURPA) is a federal law that created early opportunities for renewables in the electricity market during the 1980s. PURPA required electric utilities to purchase power from small, unregulated power producers, including renewable electric generators, at favorable prices. It spawned an entrepreneurial industry that built power plants using both renewable technologies and highly efficient cogeneration technologies. More than 10,000 megawatts of renewable generating capacity was developed through this broadening of the electricity generating business.

With the passage of the Energy Policy Act of 1992 (EPAAct), Congress established several incentives: (1) a permanent extension of the 10 percent business investment tax credit for solar and geothermal projects, excluding those owned by public utilities; (2) a production tax credit of 1.5 cents per kilowatt hour for wind

	Income Tax	Corp. Tax	Sales Tax	Property Tax	Industry Recruit.	Accel. Deprec.	Special Grants	Loan Programs
Alabama								
Alaska								
Arizona								
Arkansas								
California								
Colorado								
Connecticut								
Delaware								
D.C.								
Florida								
Georgia								
Hawaii								
Idaho								
Illinois								
Indiana								
Iowa								
Kansas								
Kentucky								
Louisiana								
Maine								
Maryland								
Massachusetts								
Michigan								
Minnesota								
Mississippi								
Missouri								
Montana								
Nebraska								
Nevada								
New Hampshire								
New Jersey								
New Mexico								
New York								
North Carolina								
North Dakota								
Ohio								
Oklahoma								
Oregon								
Pennsylvania								
Puerto Rico								
Rhode Island								
South Carolina								
South Dakota								
Tennessee								
Texas								
Utah								
Vermont								
Virgin Islands								
Virginia								
Washington								
West Virginia								
Wisconsin								
Wyoming								
Totals	11	8	10	16	8	1	8	12

Source: Database of State Incentives for Renewable Energy, North Carolina Solar Center, 1999

Local governments have recognized the leadership role that they can play in lowering barriers to the use of renewable energy. Special financial incentives to foster the use of renewable energy have been enacted by 35 states or jurisdictions.

energy and “closed-loop” biomass systems, available to qualified projects; and (3) a 1.5 cent per kilowatt-hour production incentive payment for solar, wind, biomass (excluding waste-to-energy), and geothermal (excluding dry steam) generation by publicly owned utilities and rural electric cooperatives. No action has been taken by Congress to extend the two production incentives beyond 1999, although proposals for such extensions have been offered.

State policies have also encouraged the development of renewable electricity. In keeping with the requirements of PURPA, many states have required utilities to offer power purchase contracts to renewable energy developers to help promote the growth of the industry. The availability of these contracts was the primary reason why California has led in the development of wind, solar, and geothermal resources.

Other state policies that have promoted renewables include financial incentive programs, integrated resource planning, and net metering. State financial incentives have included tax reductions and exemptions and low interest loans. However, they are not universally available or promoted. Integrated resource planning (IRP) was developed as a regulation tool for comparing the values of different resource alternatives. IRP addressed both the direct costs of power generation that have driven traditional resource decisions and indirect costs and benefits, such as relative environmental impacts. However, as electric utility restructuring has gained momentum, the role of IRP has greatly diminished.

Under net metering, electricity generated by a utility customer is sold back to the utility at the prevailing retail rate. In effect, this means that small-scale generators, such as homeowners, can run their meter backwards. The higher the prevailing customer retail rate, the more attractive the renewable investment becomes. Net metering policies for small renewable generators have been implemented in 27 states, and their prevalence appears to be growing.

Domestic Market Opportunities

Competition has come to the electric power industry. As of June 1999, 22 states had either passed legislation on electric restructuring or had issued regulatory orders by which all customers will eventually be allowed to choose their supplier. Other states are considering restructuring their electric power industry to allow customer choice. Also, several bills have been introduced in the U.S. Congress to develop national guidelines for retail competition.

In a more competitive electricity market prices will fall, making the cost threshold for renewables more demanding. If electricity is treated as just another commodity, price will be the primary factor when choosing among electricity supply options and many of the non-price attributes of renewables will continue to be undervalued. At the same time, however, market competition will give customers the opportunity to choose among power suppliers and types of electric-

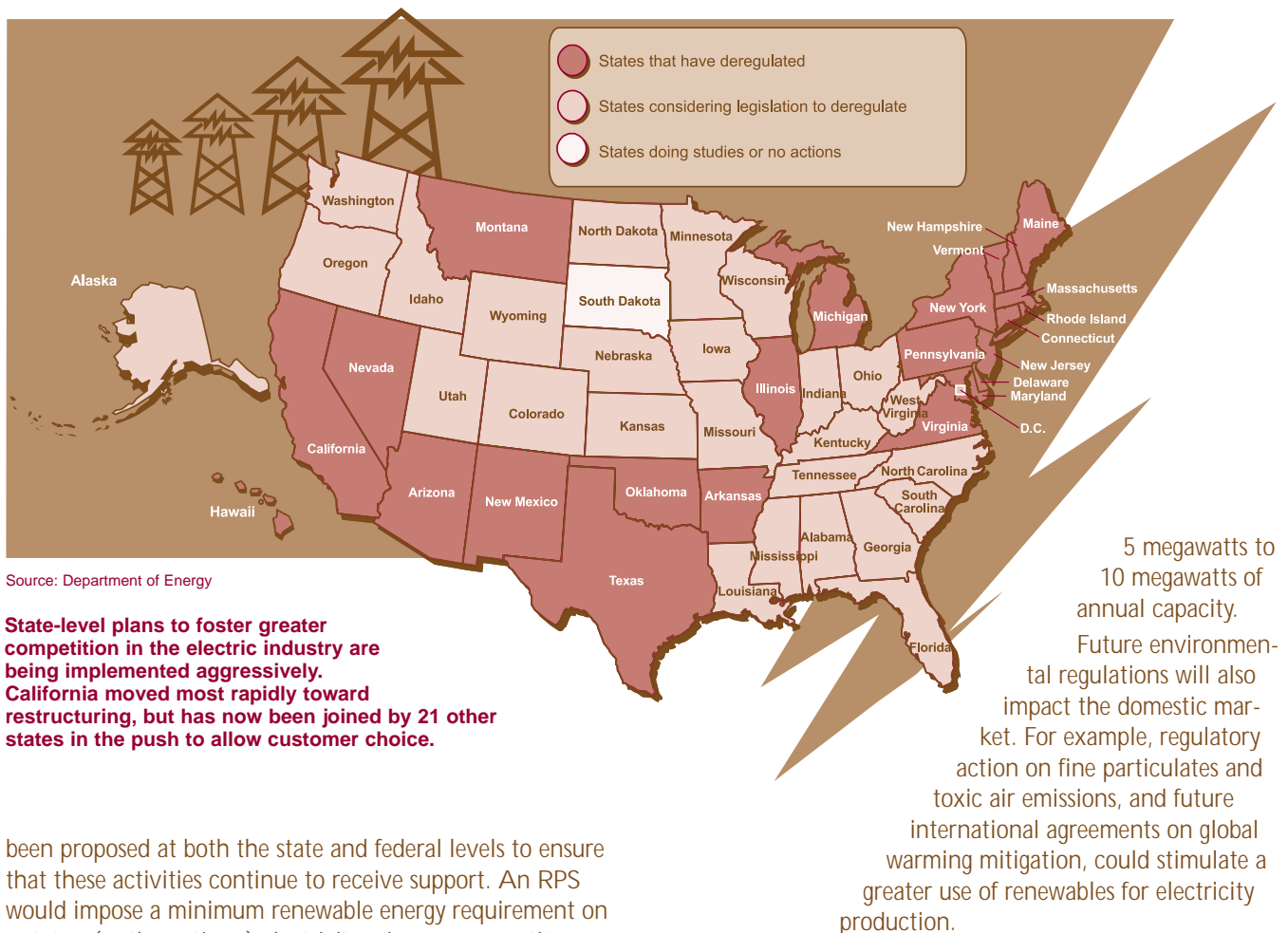
ity services. Market competition will also give customers the opportunity to choose new technologies, products, and types of energy services that could radically change the way electricity is produced and delivered.

New small-scale, modular and highly efficient generation and storage technologies such as photovoltaics, fuel cells, solar thermal dish engines, biopower, wind, and flywheels will make self-generation and storage of electricity an attractive option for homeowners and businesses. These new power technologies can be interconnected to the local distribution system to provide competitive energy services and products. Industry estimates suggest that distributed power technologies will account for between 25 to 35 percent of new generation by 2010. However, to accommodate this market in a restructured electric power industry, institutional and regulatory regimes must be redesigned. A number of states are actively examining the barriers to increased adoption of distributed technologies including New Mexico, Texas, New York, California, Iowa, and Vermont. These efforts include regulations for grid interconnection standards, contractual issues, and control and safety.

Customers with a preference for cleaner energy sources will be able to select a provider that meets those requirements. The term “green power marketing” describes the offering of environmentally responsible electricity services in a competitive marketplace. Green power marketing gives consumers an option to purchase renewables-based electricity services. Customer preference and response to green power options are expected to be important drivers of future renewable electric project development, provided that fair and open competition can be realized. In California, 18 months after the start of retail competition, there are 16 green power products available for the residential sector alone. An independently administered Green-e certification program is now available to certify the 50 percent minimum renewable content of a green power product.

In addition to renewable offerings in customer choice pilot programs and retail competition programs, nearly 50 utilities currently either offer, or are exploring ways to provide, renewables-based electricity services through “green pricing” programs. These programs offer their customers a way of supporting a greater level of utility investment in renewables. Through these programs, customers agree to pay a premium price for green power, either as a fixed additional cost on their bill or as a higher per kilowatt-hour price. However, the full potential for green power lies in a truly competitive marketplace where consumers have a greater choice of suppliers and services and are equipped with adequate information regarding the relative attributes of different energy options.

Traditionally, the regulated utility industry has provided important public benefits such as low-income energy assistance, energy R&D, and energy efficiency and renewable energy programs. Two policies, an RPS and an SBC, have



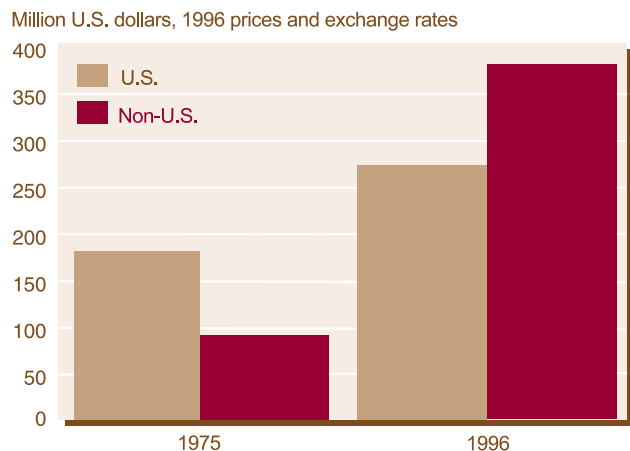
been proposed at both the state and federal levels to ensure that these activities continue to receive support. An RPS would impose a minimum renewable energy requirement on a state's (or the nation's) electricity mix — every entity participating as an electricity supplier would be required to provide and maintain a certain percentage of its supply from renewable energy sources. Electricity suppliers could alternatively purchase tradable credits to meet their portfolio requirement. Such a trading scheme would enhance the value of renewable energy resources and at the same time use market forces to minimize the costs of developing and maintaining the renewables supply portfolio. The RPS is envisioned as an interim policy to help ensure that a market for renewable electricity continues to develop during the transition to a truly competitive market. An SBC would impose a fee to be collected from all electricity customers to fund electricity-related public goods programs, including renewables. Thirteen states have established firm plans to introduce retail electric competition and have adopted one or both of these policies.

Ultimately, a key argument for policies such as the RPS or SBC lies in their potential to help expand domestic markets for renewables. As market size grows, production costs should decline, allowing renewables to become fully competitive with traditional sources. For example, BP Amoco Solar has estimated that it can cut photovoltaic production costs by 30 percent by doubling its manufacturing plant size, from

International Markets and Barriers

Today, the most rapidly growing markets for many renewable energy technologies are overseas. These markets are growing because other industrial countries are responding more aggressively to environmental concerns and because of the exploding growth in many developing countries. Developing countries have limited infrastructure and high energy prices, which create numerous market opportunities for renewable energy technologies. In 1996, for example, about 80 percent of the world market for photovoltaics was outside of the United States and two thirds of U.S. photovoltaics production was exported. The world market for wind turbines was about 1,550 megawatts in 1997, with almost all of that market outside of the United States. Similarly, large markets for biomass, geothermal, and solar thermal power are increasingly found outside of the United States.

Numerous barriers exist to the increased use of renewable energy in developing countries. These include taxes and tariffs on imported equipment, which increase costs of non-locally produced technology, lack of distribution infrastructure for selling and maintaining systems in rural areas, lack



International public sector investment in renewable energy R&D has grown more than two-fold since 1975. During that period, however, the United States' leadership position has eroded to the point where the U.S. government now ranks sixth among industrialized countries in renewable energy R&D per dollar of gross domestic product.

of finance mechanisms to enable the purchase of systems, lack of information, lack of a trained work force, lack of familiarity with and thus confidence in renewable technologies, and others. However, many renewable energy technology companies do not have the financial strength needed to make these investments.

In addition, the international marketing efforts of U.S. companies are frequently hindered by the public-private partnerships of other governments. Concessionary financing is often used by European countries and Japan to establish a company's presence in these markets and to capture early market share. A recent review found that concessionary finance, roughly equivalent to a 10 percent capital subsidy, supported the establishment of 9 of 13 wind farms in China. U.S. companies find it difficult to compete against these foreign subsidies without similar federal support. In addition, U.S. companies are not able to match the extensive technical assistance and other forms of support that are provided by foreign governments to promote their own companies.

The Role of Research and Development

Although the costs of renewables have fallen, there are still many opportunities to achieve lower costs and greater reliability through technical advances. A robust federal R&D program has been an essential element of a government/industry partnership to achieve these technical advances. In order to maintain this progress, the U.S. Department of Energy, Office of Power Technologies has established a goal of 30,000 megawatts of non-hydropower renewable capacity by 2020. One way to conduct this R&D is through cost-shared partnerships between the federal government and industry. For example, the federal government has been partnering with the photovoltaic industry on the Photovoltaic Manufacturing Technology project, which has led to significant cost reductions in photovoltaic manufac-

turing.

The federal government is also partnering with the electric utility industry. This allows utilities to gain experience with renewables while contributing to technology development. One example is the utility consortium that was formed to build the Solar Two project in Barstow, California. Another example is industry development efforts on biomass gasifier technology, which offers significant cost, efficiency, and emissions improvements over conventional biomass combustion.

A stakeholder consensus building effort for wind power is being led by the National Wind Coordinating Committee (NWCC). The NWCC's objective is to ensure the responsible use of wind power in the United States. Through the establishment of a dialogue among key electric market stakeholders, the committee identifies and addresses issues that impact the use of wind power. The committee's vision is the development of a self-sustaining commercial market for wind power.

At a time when worldwide government support for renewable R&D is on the upswing, federal funding for renewable energy is on the decline. In 1975, the United States accounted for nearly three fourths of industrialized nations' investments in renewable energy R&D; in 1997, it accounted for less than half. This decline placed the United States eighth among industrialized nations in renewable energy R&D spending as a percentage of total energy R&D and sixth in renewable energy R&D investment per dollar of gross domestic product.

Conclusion

Renewable energy technologies already contribute to the global energy mix and are ready to make an even greater contribution in the future. However, the renewables industry faces critical market uncertainties, both domestically and internationally, as policy commitments to renewables at both the federal and state levels are being reshaped to match the emerging competitive marketplace.

The energy decisions that we make, or fail to make, today will have long-lasting implications. Do we follow the path of business-as-usual, a path that does not begin to lay the foundation for a sustainable energy future and threatens the viability of our domestic renewables industries? Or do we choose a path toward a brighter future, one in which renewables play a larger role in meeting our future energy needs? We have the power to choose.